

A 3D cutaway diagram of a particle detector calorimeter, showing various internal components like the calorimeter cells, support structures, and cooling systems. The diagram is rendered in a semi-transparent style, revealing the complex internal geometry. The colors used for different parts include red, green, blue, yellow, and grey.

Standardized Calorimetry QA

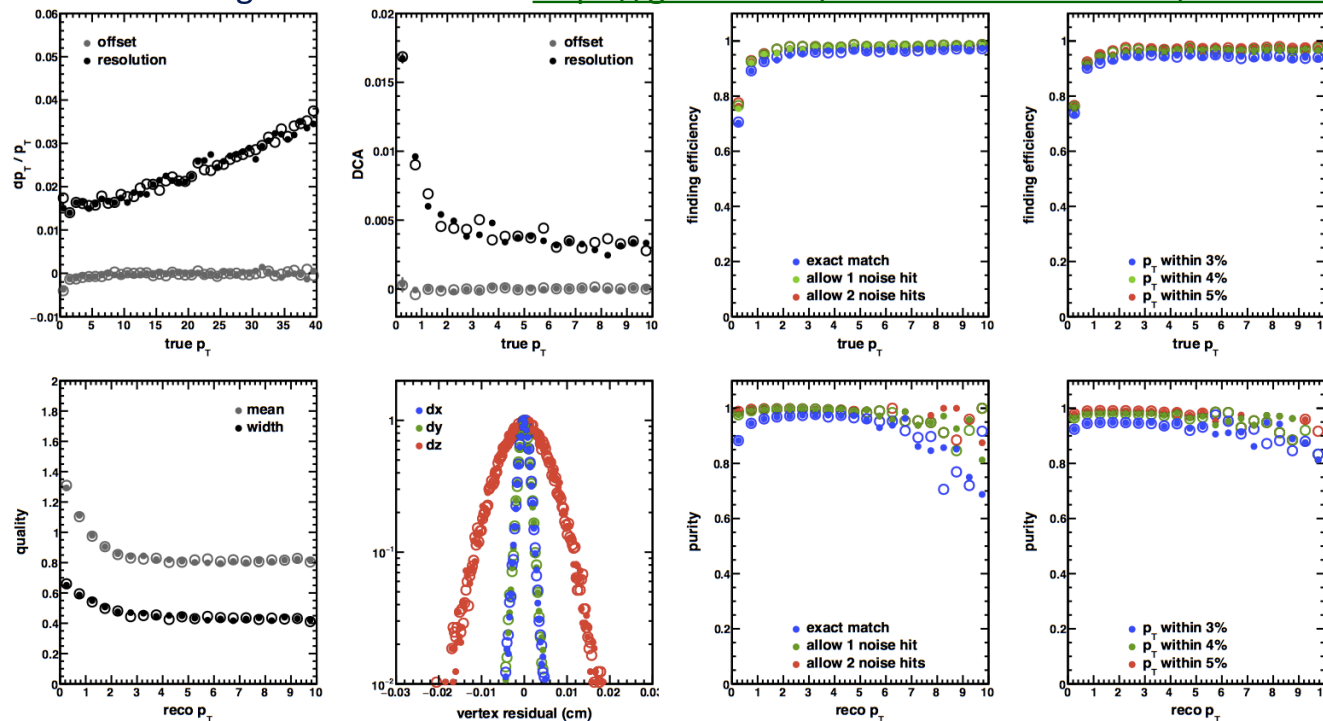
Part I of III – Calorimeter subsystem checks

Jin Huang (BNL)

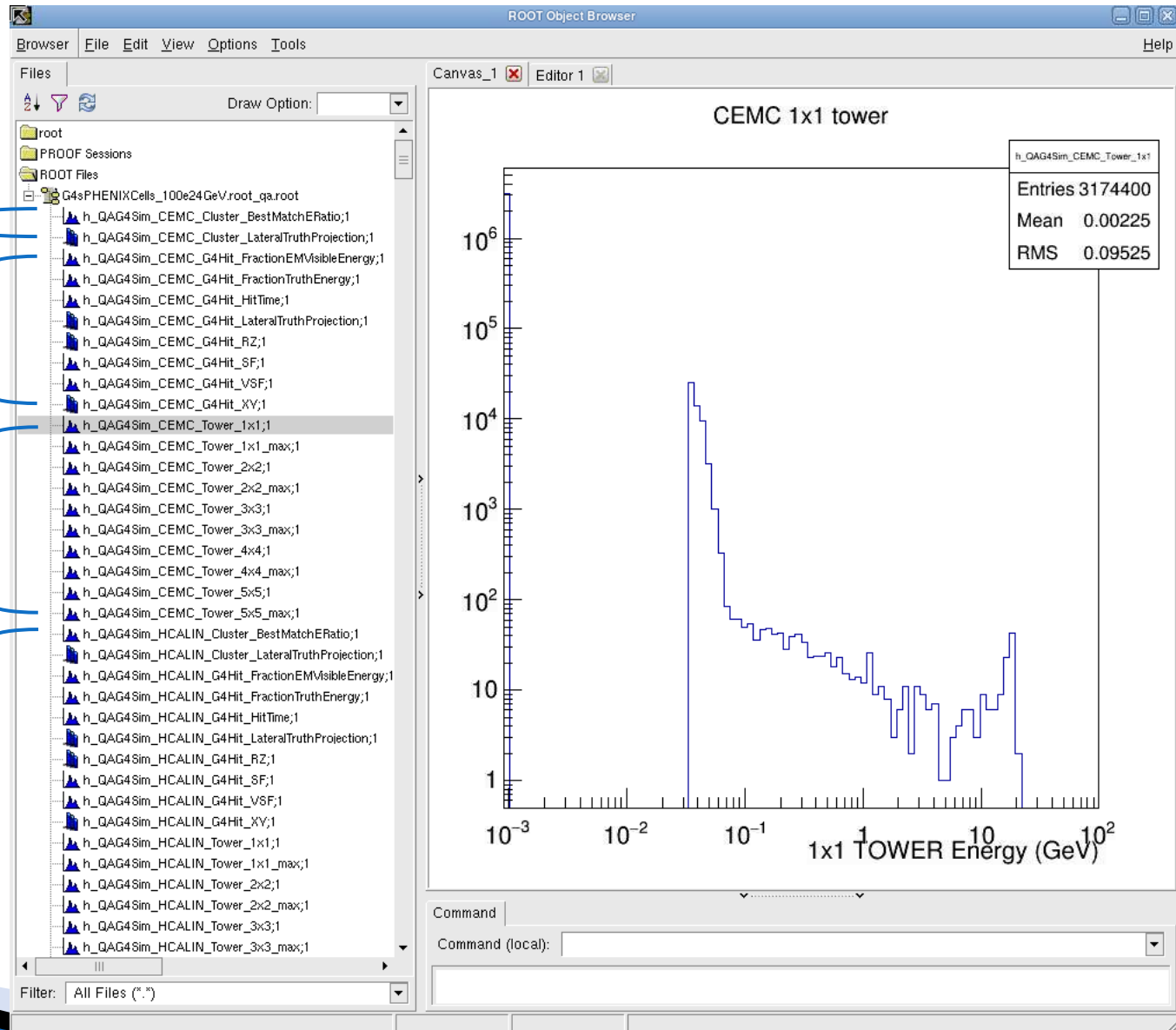
Introduction

- ▶ Today's discovery is tomorrow's calibration
- ▶ We need a standardized module to quickly check calorimetry performance, similar to that of tracking check from Mike
- ▶ Connected to plan on implementing QA history for ANA builds and new code submissions.
- ▶ Planning three QA modules 1) each of three subsystems 2) tracking + three calorimeter 3) jets.
- ▶ First of the three stage report today: also on pull request <https://github.com/sPHENIX-Collaboration/coresoftware/pull/104>

Standardized tracking check from Mike: <https://github.com/sPHENIX-Collaboration/coresoftware/pull/89>



QA histogram overview



CEMC/Clusters

CEMC/Geant4 checks

CEMC/Towers

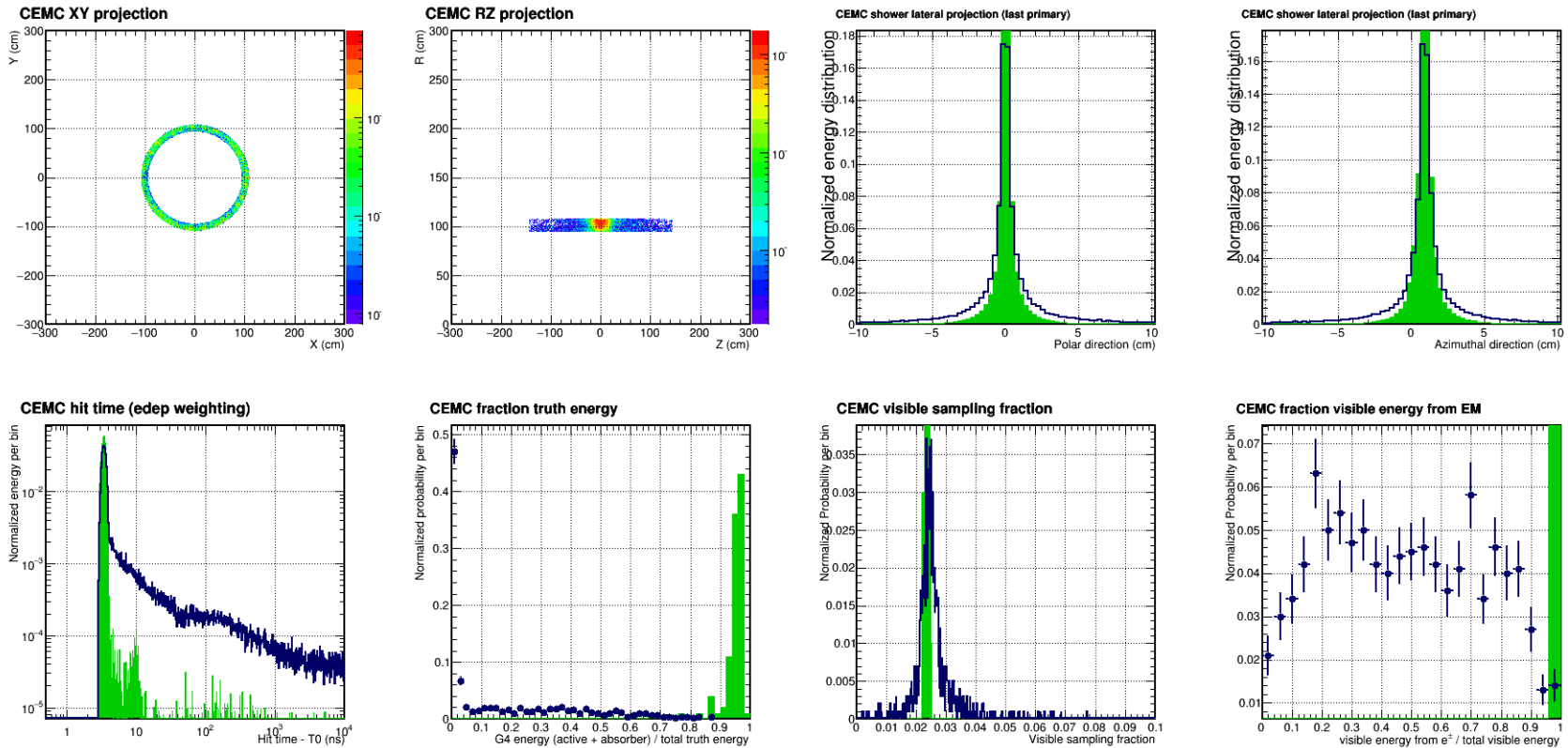
HCALIN/HCALOUT/...

Geant4 production level checks



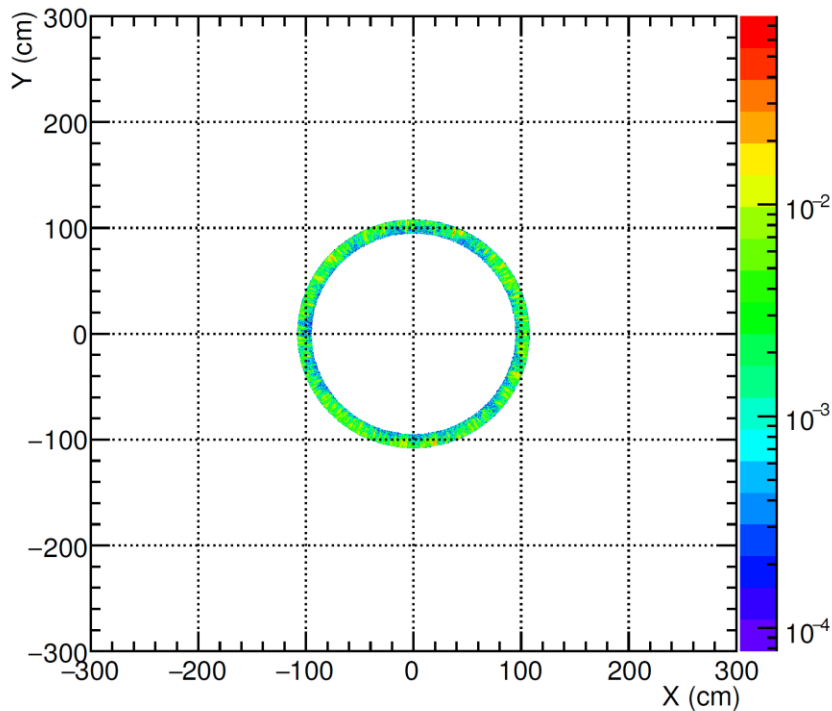
CEMC example

- 24GeV pi- simulation in inspection
- 24GeV e- simulation as reference

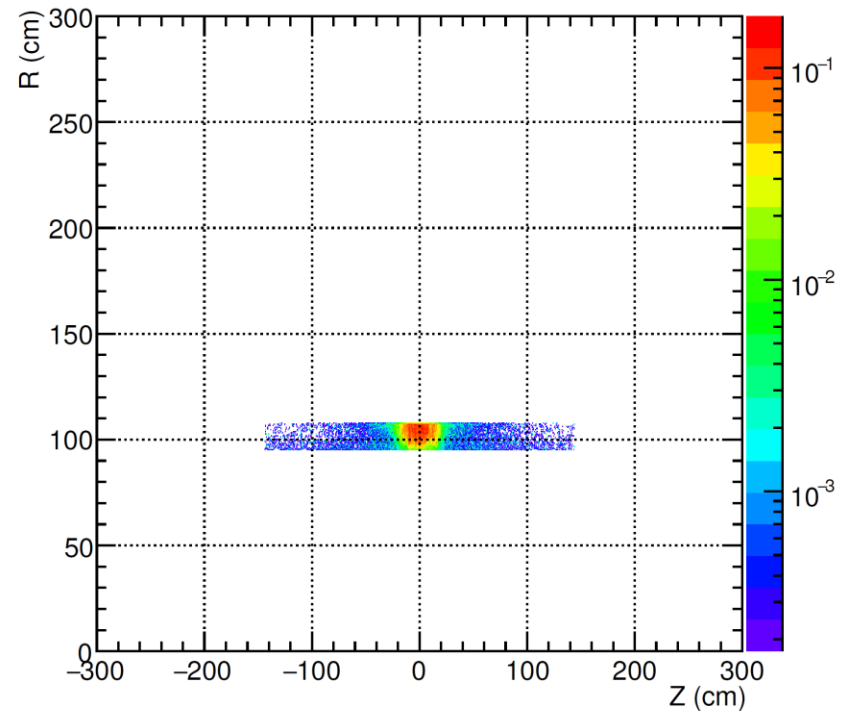


CEMC/Zoom-in

CEMC XY projection

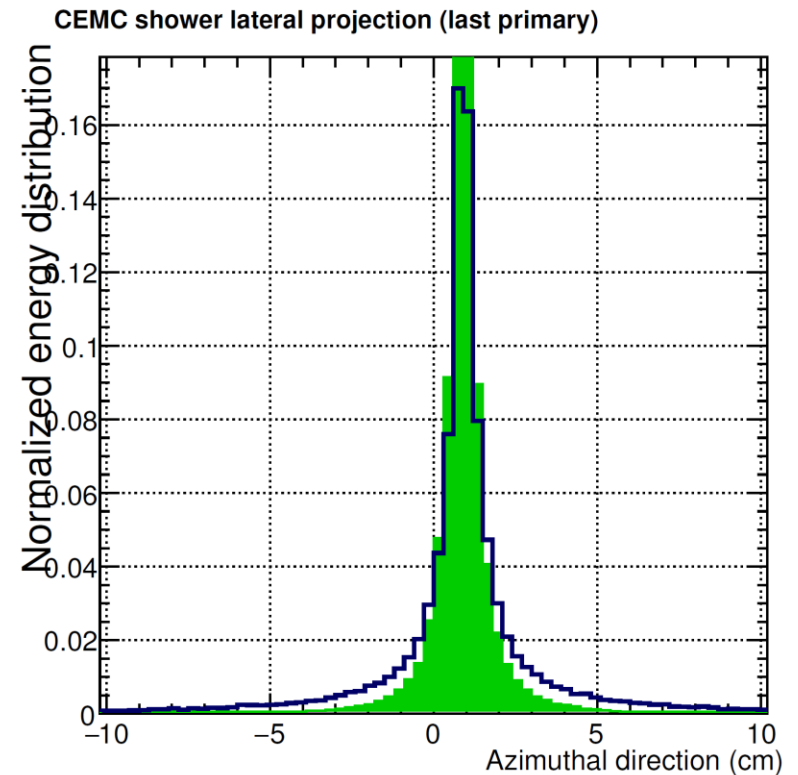
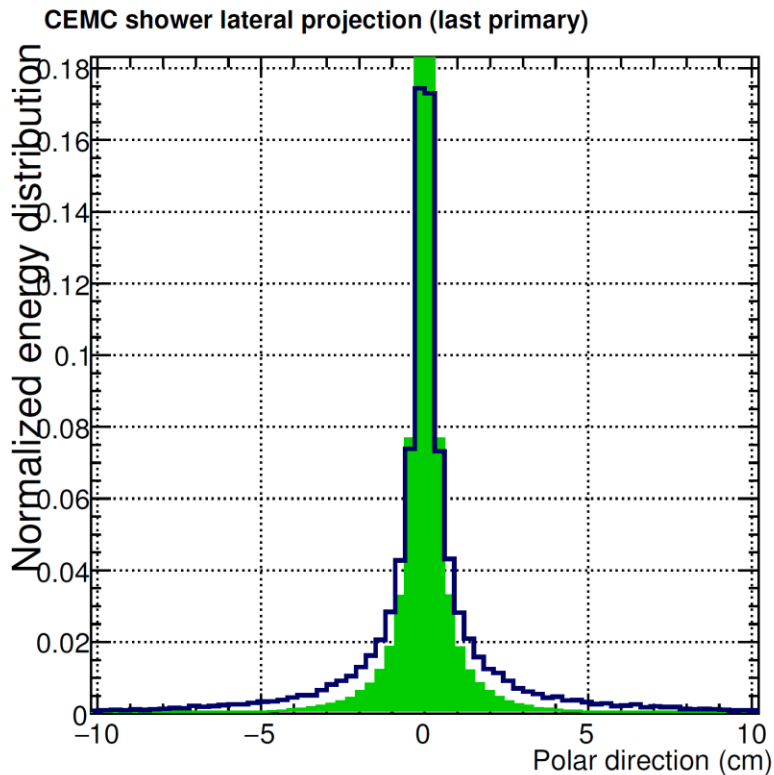


CEMC RZ projection



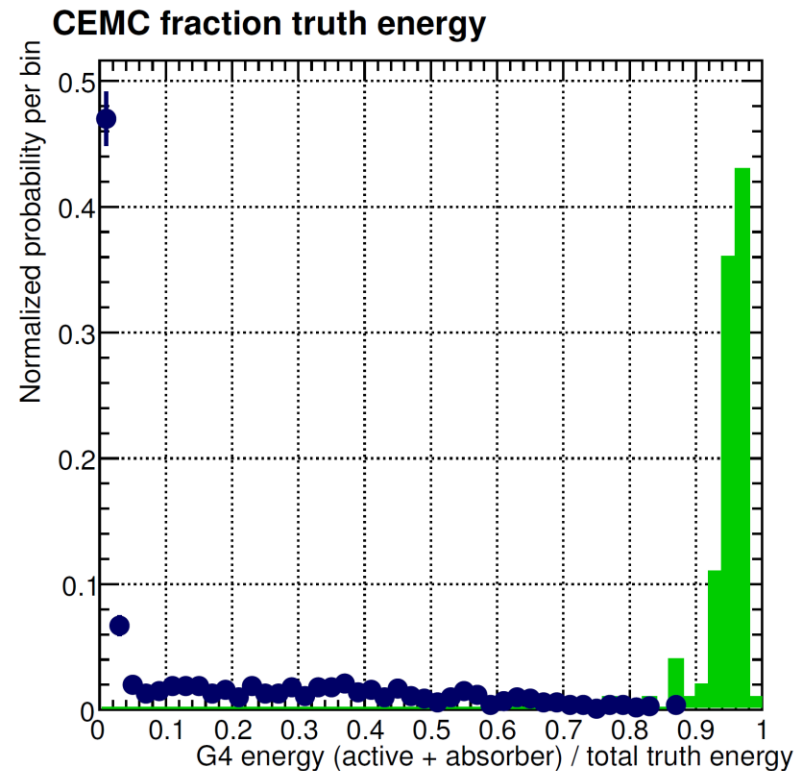
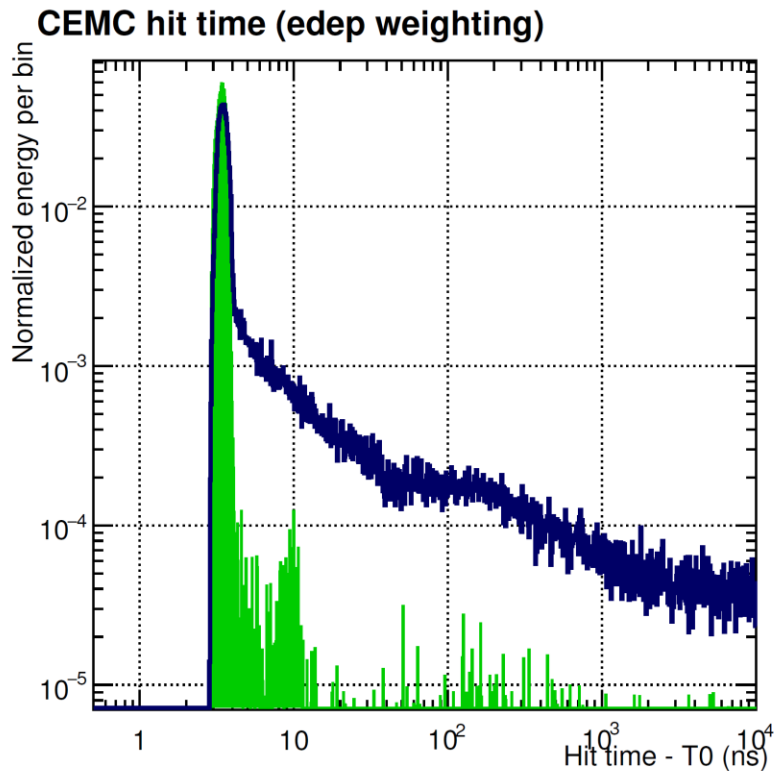
CEMC/Zoom-in

- 24GeV pi- simulation in inspection
- 24GeV e- simulation as reference



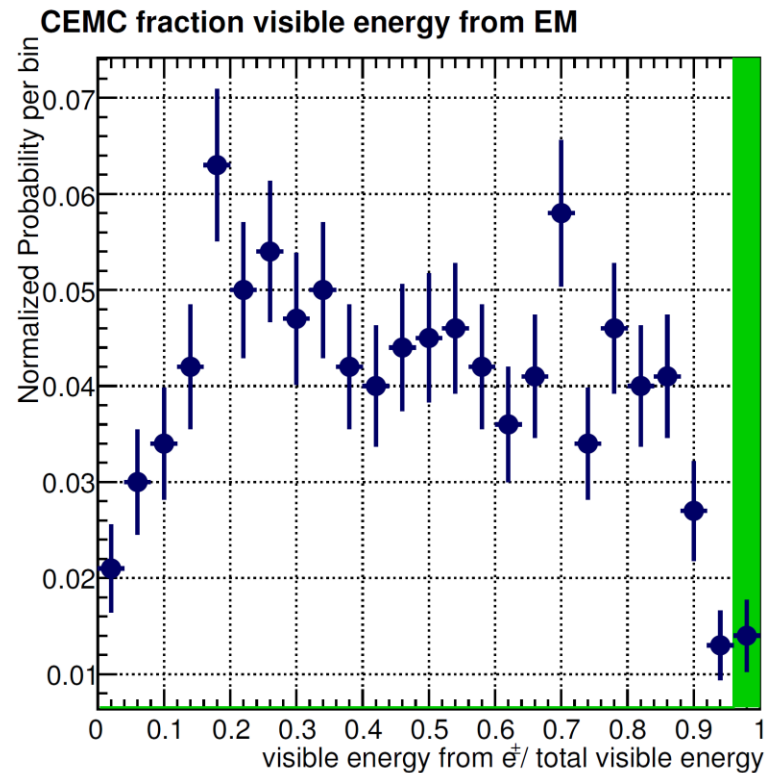
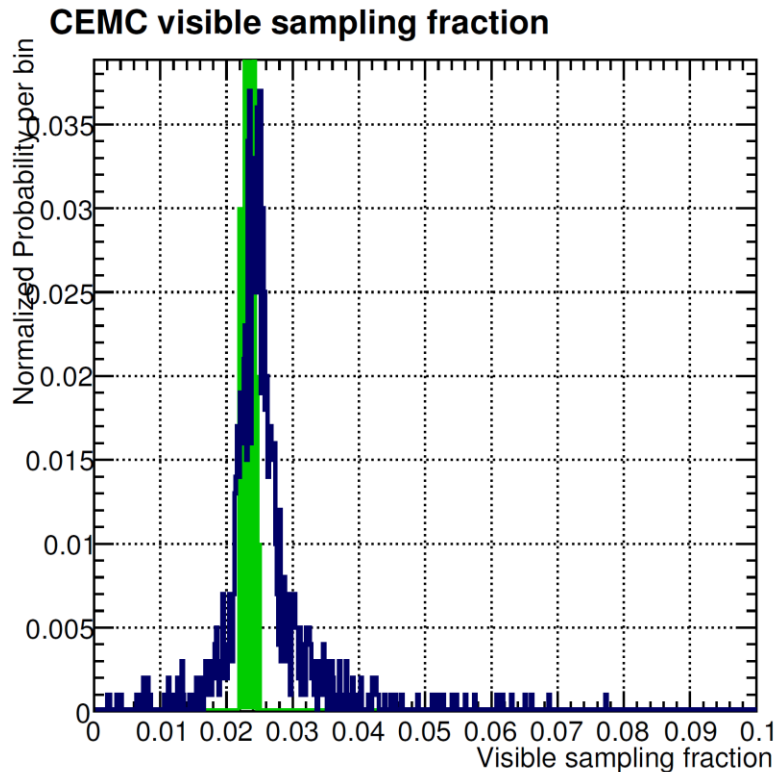
CEMC/Zoom-in

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CEMC/Zoom-in

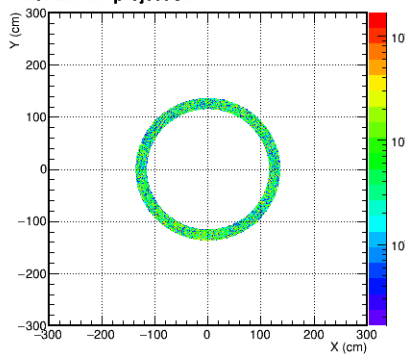
- 24GeV pi- simulation in inspection
- 24GeV e- simulation as reference



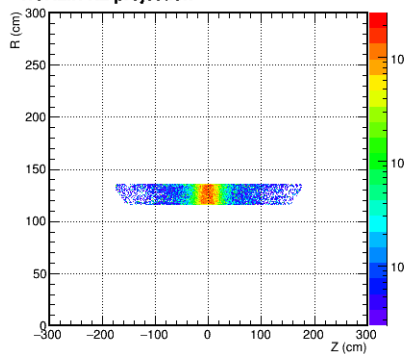
HCALIN

- 24GeV pi- simulation in inspection
- 24GeV e- simulation as reference

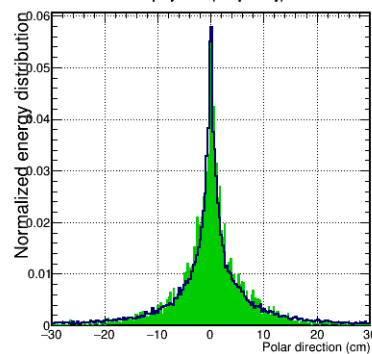
HCALIN XY projection



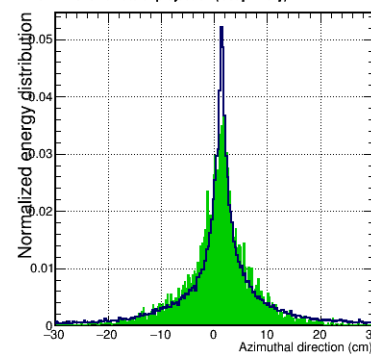
HCALIN RZ projection



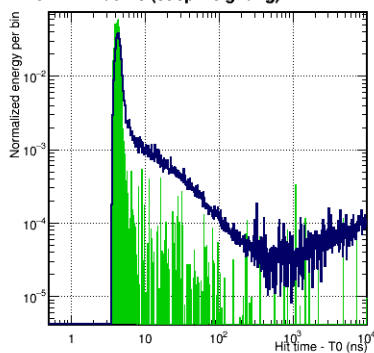
HCALIN shower lateral projection (last primary)



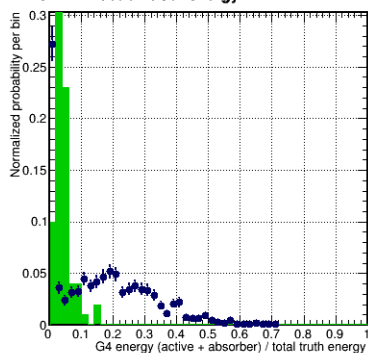
HCALIN shower lateral projection (last primary)



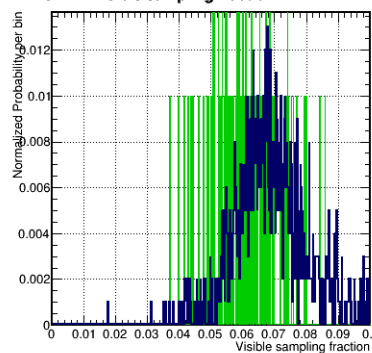
HCALIN hit time (edep weighting)



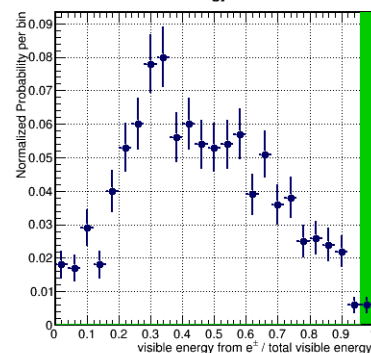
HCALIN fraction truth energy



HCALIN visible sampling fraction

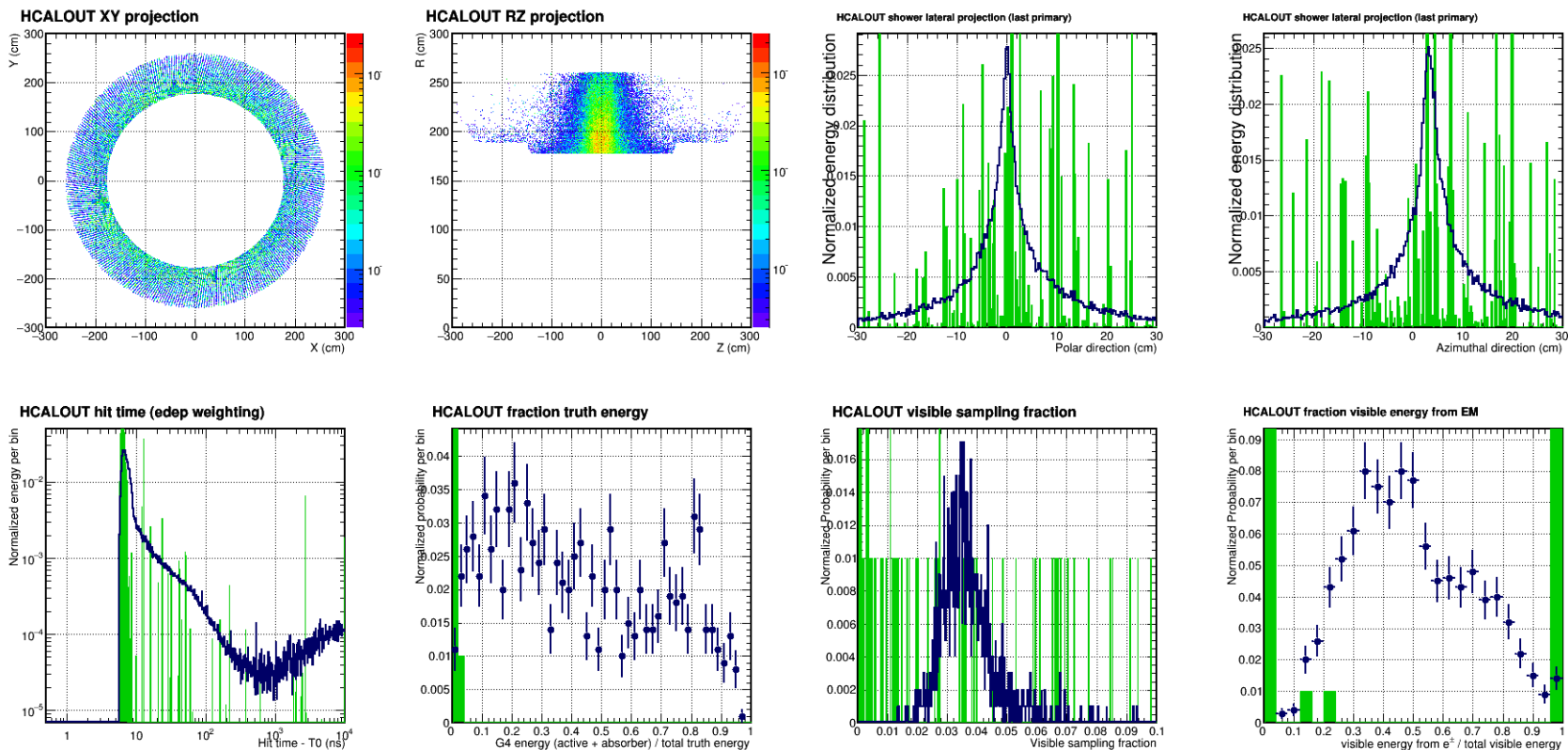


HCALIN fraction visible energy from EM



HCALOUT

- 24GeV pi- simulation in inspection
- 24GeV e- simulation as reference

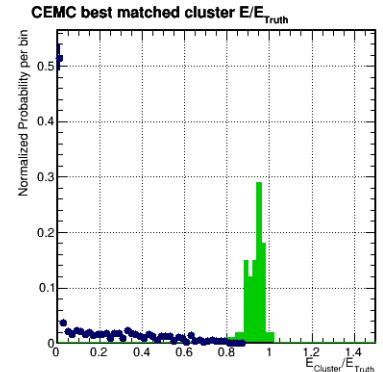
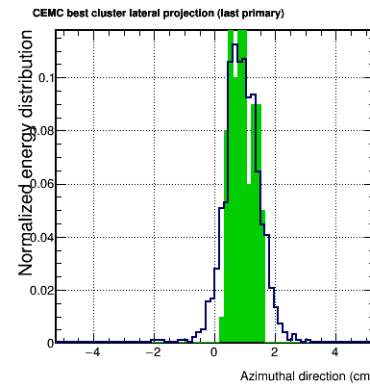
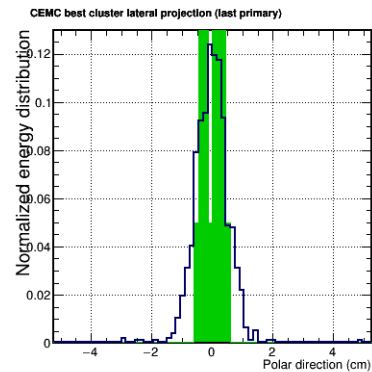
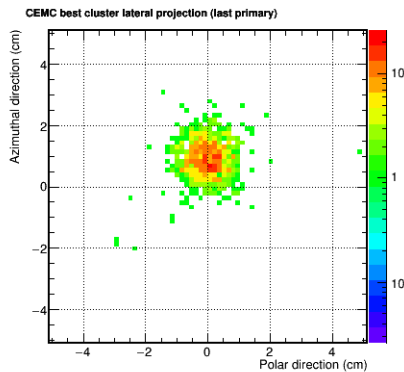
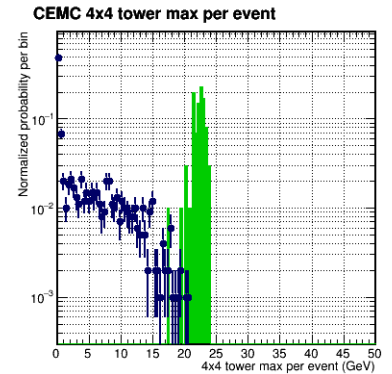
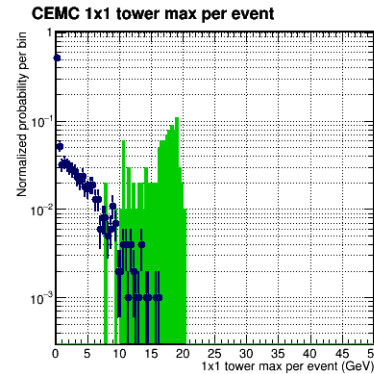
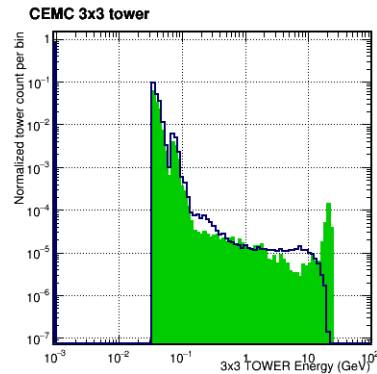
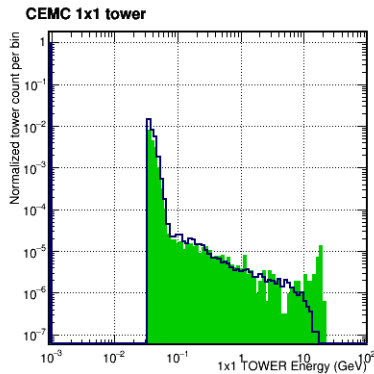


Post production reconstruction level checks



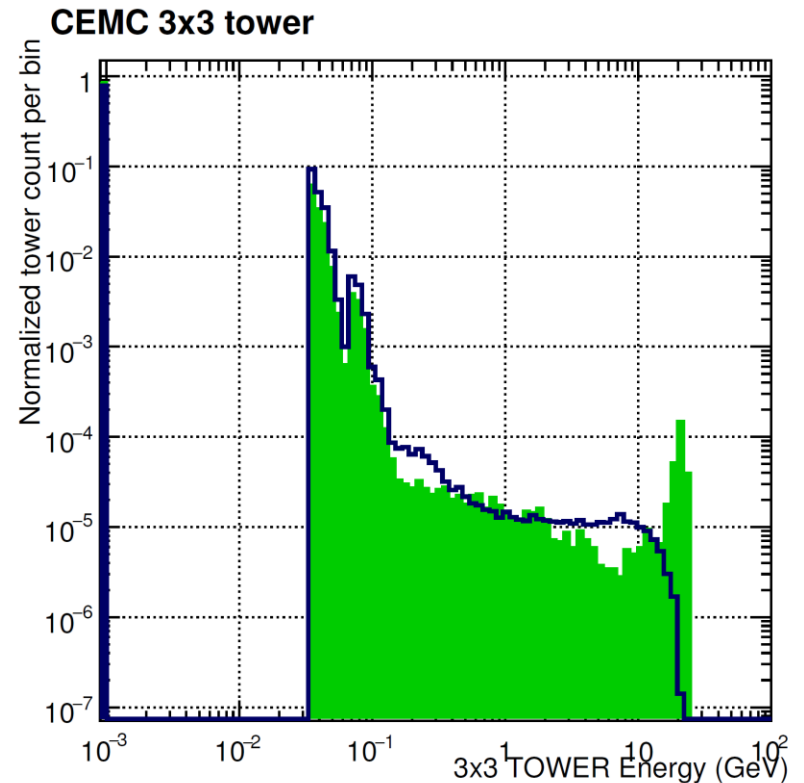
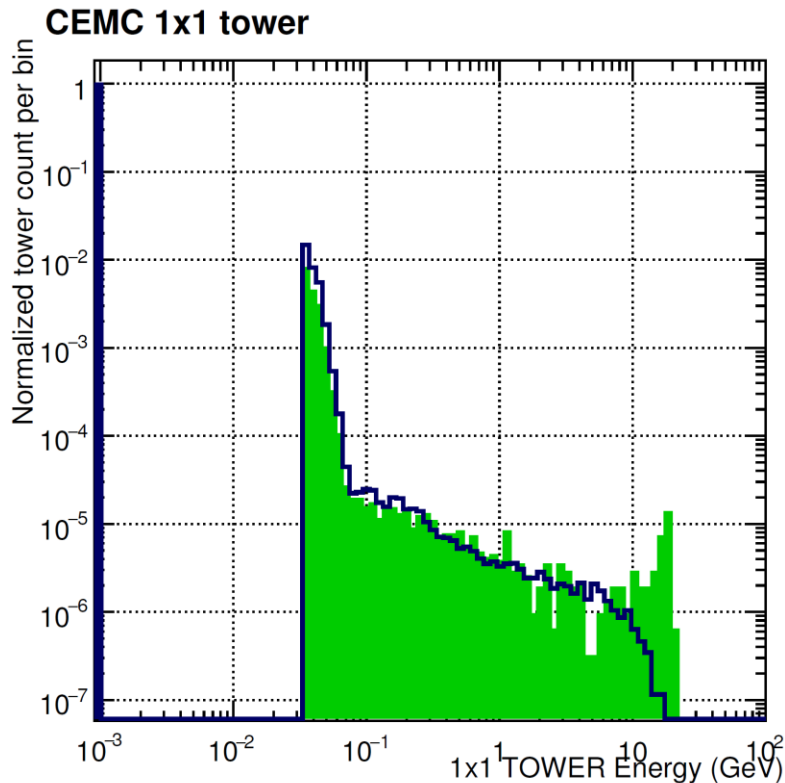
CEMC Example

- 24GeV pi- simulation in inspection
- 24GeV e- simulation as reference



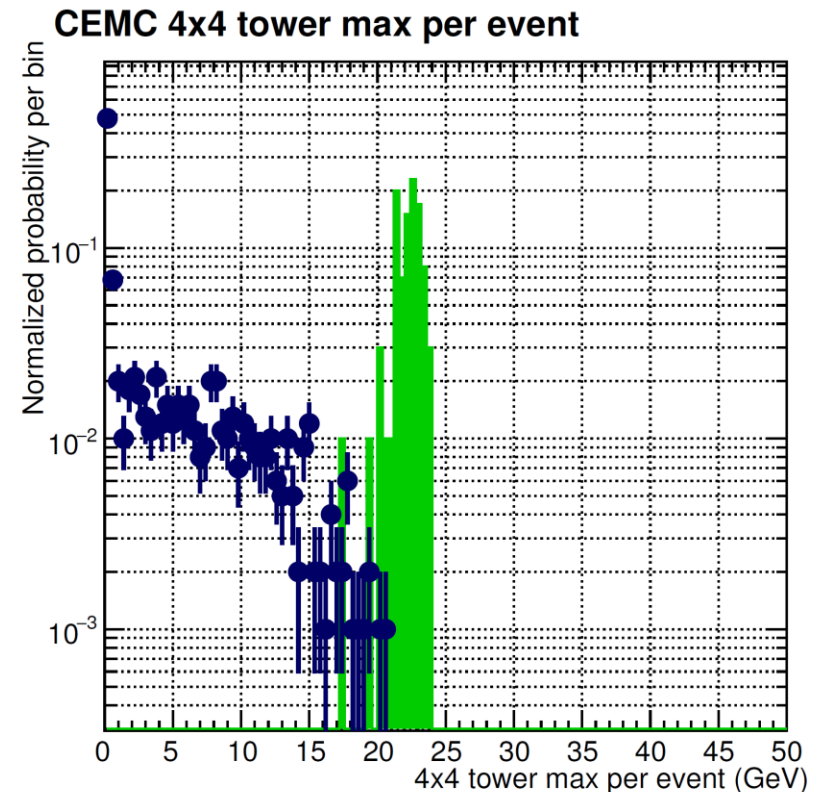
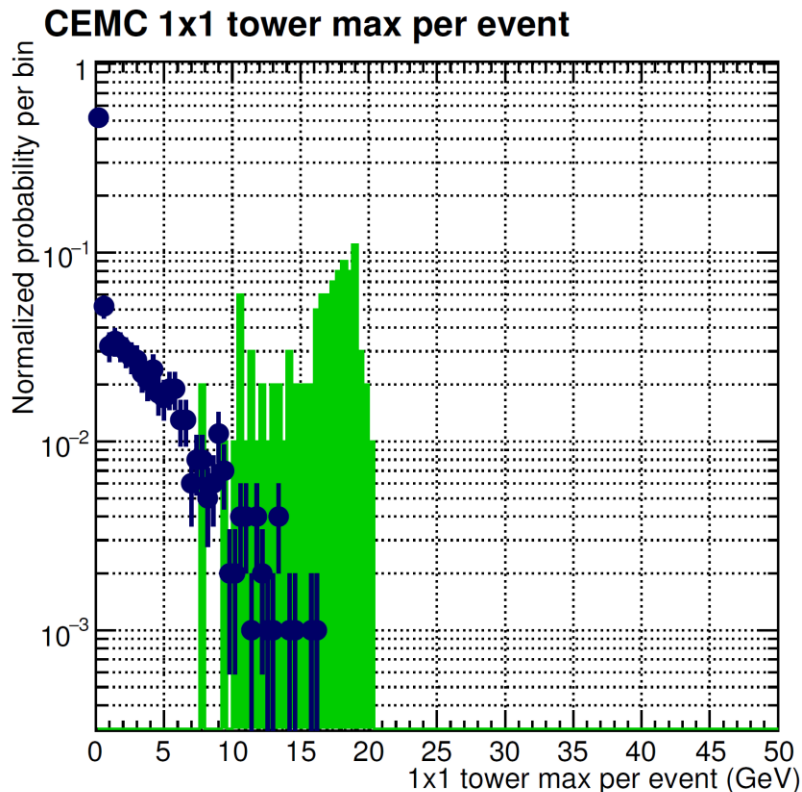
CEMC/Zoom-in

- 24GeV pi- simulation in inspection
- 24GeV e- simulation as reference



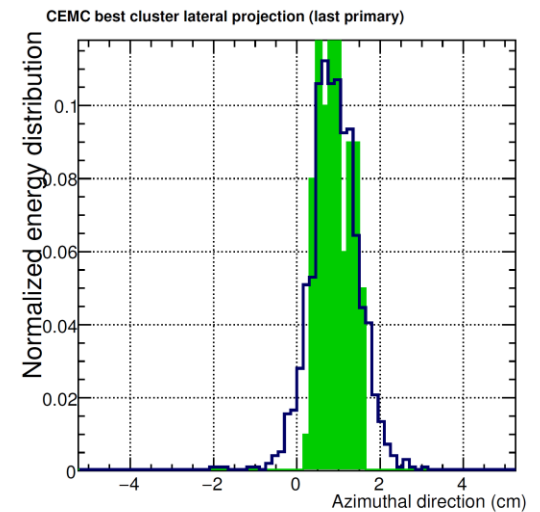
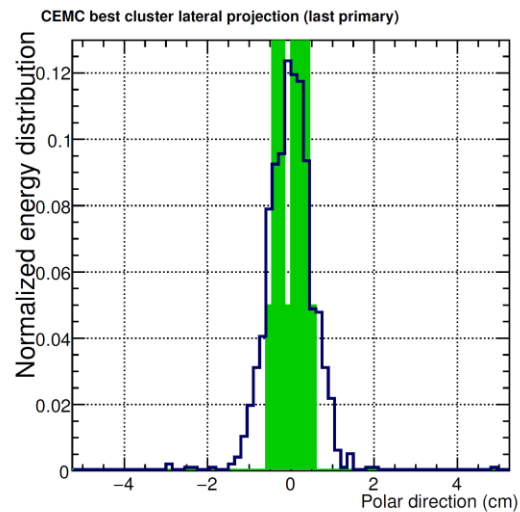
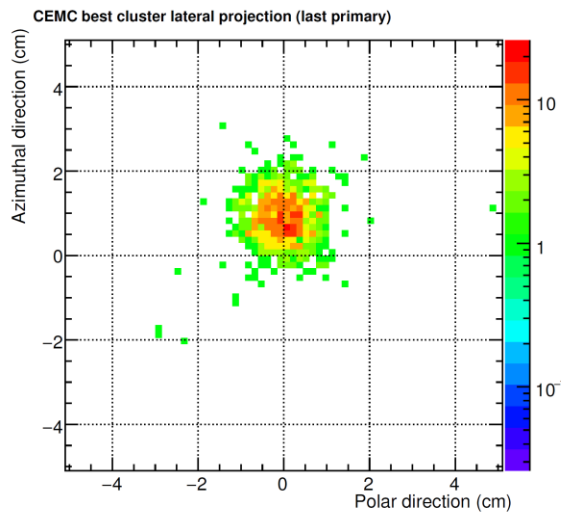
CEMC/Zoom-in

- 24GeV pi- simulation in inspection
- 24GeV e- simulation as reference



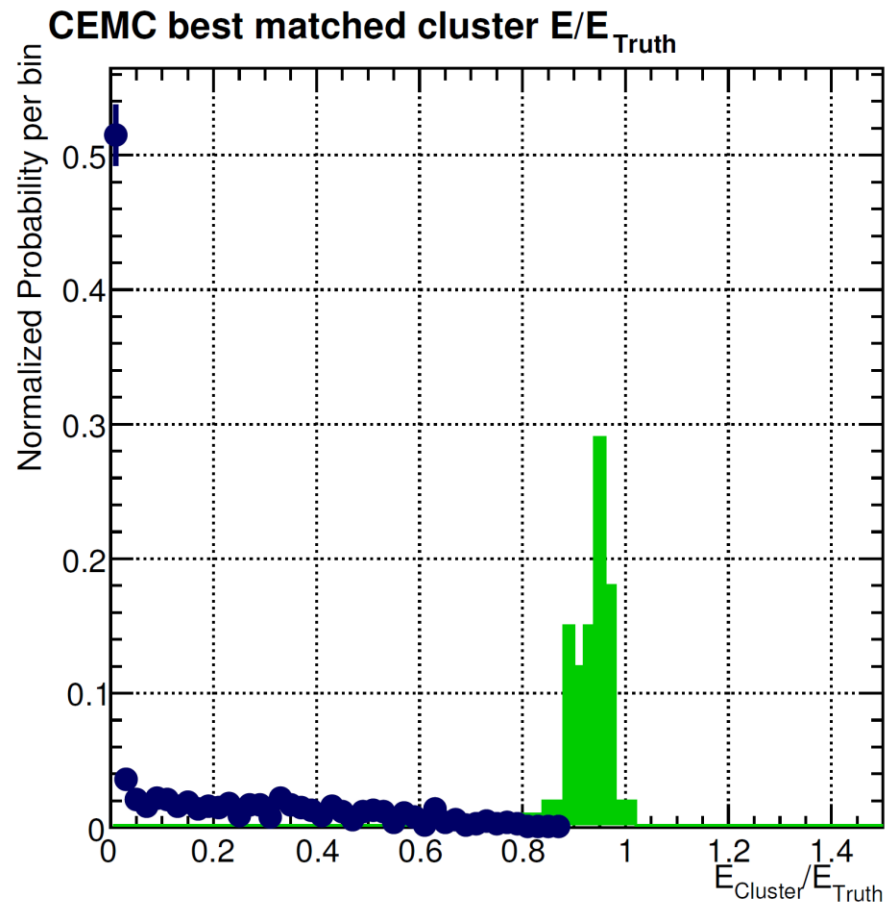
CEMC/Zoom-in

- 24GeV pi- simulation in inspection
- 24GeV e- simulation as reference



CEMC/Zoom-in

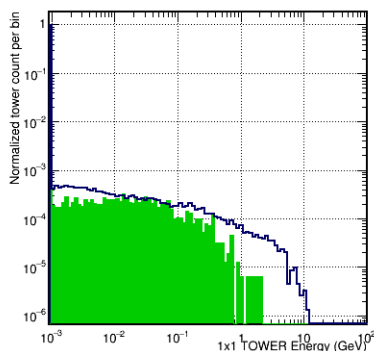
- 24GeV pi- simulation in inspection
- 24GeV e- simulation as reference



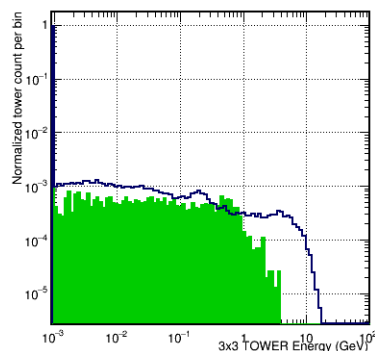
HCALIN

- 24GeV pi- simulation in inspection
- 24GeV e- simulation as reference

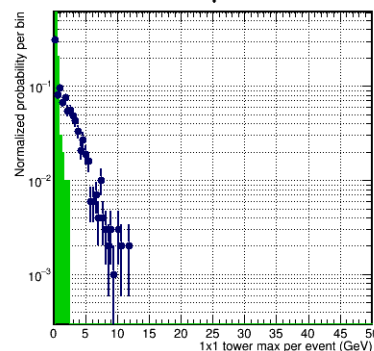
HCALIN 1x1 tower



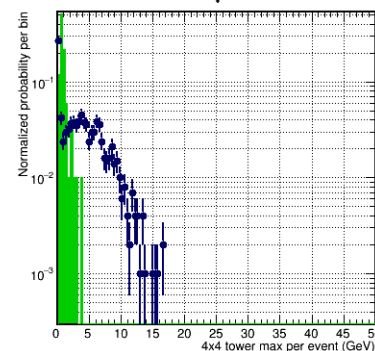
HCALIN 3x3 tower



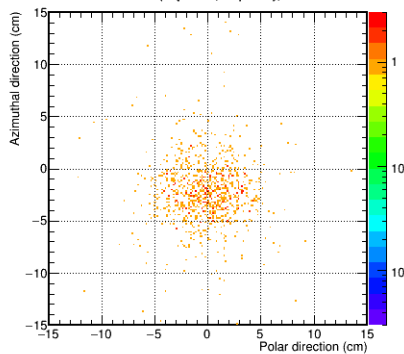
HCALIN 1x1 tower max per event



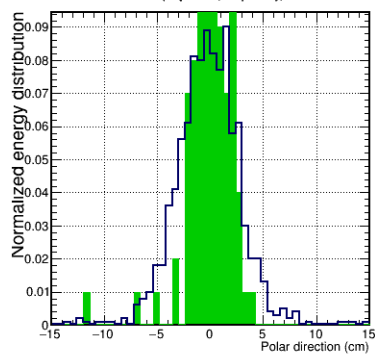
HCALIN 4x4 tower max per event



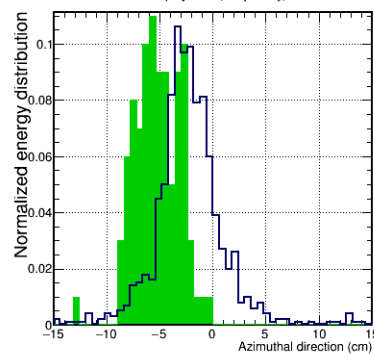
HCALIN best cluster lateral projection (last primary)



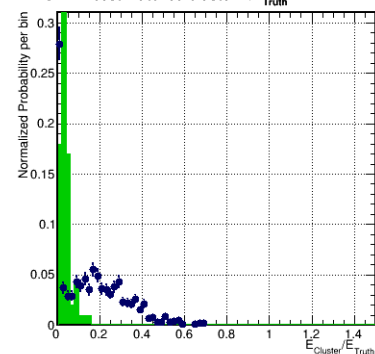
HCALIN best cluster lateral projection (last primary)



HCALIN best cluster lateral projection (last primary)



HCALIN best matched cluster E/E_{Truth}



HCALOUT

- 24GeV pi- simulation in inspection
- 24GeV e- simulation as reference

